

CLAIMS

- 1) Process for the preparation of a polymeric relief structure by
a) coating a substrate with a coating comprising one or more radiation-
sensitive ingredients,
b) locally treating the coated substrate with electromagnetic radiation having a
periodic or random radiation-intensity pattern, forming a latent image,
c) polymerizing and/or crosslinking the resulting coated substrate,
wherein in step c) a compound (Cs) is present that reduces the interfacial
tension of the coated substrate.
- 2) Process according to claim 1, wherein Cs is applied to the resulting coated
substrate of step b).
- 3) Process according to claim 1, wherein Cs is already present in the coating
used in step a).
- 4) Process according to anyone of claims 1-3, wherein the radiation-sensitive
ingredient(s) in step a) comprise(s) one or more monomers, in combination
with one or more polymerization initiators.
- 5) Process according to anyone of claims 1-4, wherein in step a) the coating also
comprises a polymer.
- 6) Process according to claim 4, wherein the polymerization initiator is a mixture
of a photo-initiator and a thermal initiator.
- 7) Process according to anyone of claims 1-6, wherein the coating is a solid film
after evaporation of the volatile solvent.
- 8) Process according to anyone of claims 1-7, wherein a lithographic mask is
used in direct contact with the photo-polymer film.
- 9) Process according to anyone of claims 1-8, wherein the electromagnetic
radiation is UV-light in combination with a mask.
- 10) Process according to anyone of claims 1-8, wherein the treatment in step b) is
by the use of light interference/ holography.
- 11) Process according to anyone of claims 1-10, wherein the substrate comprises
a polymer.
- 12) Process according to claim 5, wherein the polymer in the coating of step a)
has a weight averaged molecular weight (Mw) of at least 20,000 g/mol.
- 13) Process according to anyone of claims 5 or 12, wherein the polymer in the
coating of step a) has a glass transition temperature of at least 300 K.

- 14) Process according to anyone of claims 5, 12-13, wherein the polymer is dissolved in the monomer(s) of the radiation-sensitive coating used in step a).
- 15) Process according to anyone of claims 1-14, wherein the ingredient(s) in the radiation-sensitive coating is/are selected from the group comprising (meth-) acrylates, epoxies, vinyl ethers, styrenes, and thiol-enes.
- 5 16) Process according to anyone of claims 1-15, wherein Cs reduces the interfacial tension with at least 10 mJ/m².
- 17) Process according to anyone of claims 1-16, wherein Cs is applied in an amount of from 0.05 – 5 wt%, relative to the amount of the coating.
- 10 18) Polymeric relief structure obtainable through a process according to anyone of claims 1-17.
- 19) Polymeric relief structure according to claim 18, wherein the aspect-ratio (AR) is at least 0.12, the AR being the ratio between the relief height and the distance between neighboring reliefs
- 15 20) Polymeric relief structure according to anyone of claims 18-19, wherein the maximum absolute value of the curvature ($|k_{\max}|$) is at least 0.35, more preferably at least 0.45, and even more preferably at least 0.65 μm^{-1}
- 21) Polymeric relief structure according to anyone of claims 18-20, wherein the AR is at least 0.2.
- 20 22) Polymeric relief structure according to anyone of claims 18-21, wherein $|k_{\max}|$ is at least 0.7 μm^{-1} .
- 23) Process according to anyone of claims 1-17, wherein step b) is performed at a temperature between 175 and 375 K.
- 24) Process according to anyone of claims 1-17 and 23, wherein step c) is performed at a temperature of between 300 and 575 K.
- 25 25) Use of a polymeric relief structure according to anyone of claims 18-22, or prepared in a process according to anyone of claims 1-17 or 23-24 in light-management applications.
- 26) Use according to claim 25 in diffractive- or holographic-optical elements.
- 30 27) Use of a polymeric relief structure according to anyone of claims 18-22 or prepared in a process according to anyone of claims 1-17 or 23-25 as a master for replication purposes in organic or inorganic matter.